N A T O

C O B P

Code Of Best Practice
for
C² Assessment

Decisionmaker's Guide

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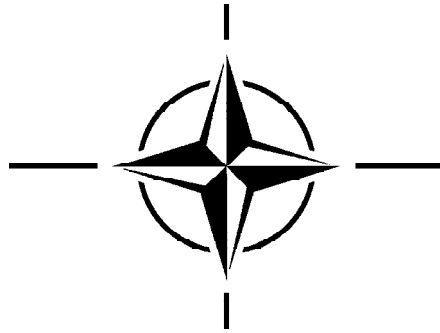
A DoD CCRP/NATO Collaboration

This major revision to the Code of Best Practice for C2 Assessment is the product of a NATO Research and Technology Organisation (RTO) sponsored Research Group (SAS-026). It represents over a decade of work by many of the best analysts from the NATO countries. A symposium (SAS-039) was hosted by the NATO Consultation Command Control Agency (NC3A) and provided the venue for a rigorous peer review of this code.

This publication is the latest in a series produced by the Command and Control Research Program (CCRP) under the auspices of the Assistant Secretary of Defense (C3I). The CCRP has demonstrated the importance of having a research program focused on the national security implications of the Information Age. The research sponsored and encouraged by the CCRP contributes to the development of the theoretical foundations necessary to support the Information Age transformation of the Department. Other CCRP initiatives are designed to acquaint military and civilian leaders with emerging issues related to transformation. This CCRP Publication Series is a key element of this effort.

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NATO Code
of
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for
C2 Assessment

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N A T O   C O D E   O F B E S T   P R A C T I C E   F O R C 2   A S S E S S M E N T

Decisionmaker's Guide

Introduction

Purpose

NATO has produced a Code of Best Practice (COBP)[1] in order to facilitate high quality assessments supporting decisionmaking in the area of Command and Control (C2). The COBP is the product of international collaboration drawing together the operational and analytical experience of leading military and civilian defence experts from across the NATO nations. The COBP enhances the understanding of best practice and outlines a structured process for the conduct of operational assessment for C2, which is the core capability of Information Age defence and security.

The command and control aspects of military capability are difficult to assess. Use of the COBP will:

  • Increase the likelihood of quality products

- Complete

- Relevant

- Transparent (visible)

- Credible (believable)

- Authoritative (rigorous)

• Reduce risk/cost associated with producing the products

The COBP emphasizes the critical role of decisionmakers in the conduct of good assessment and describes a framework to help to structure this participation. The COBP should be used by decisionmakers to frame study requirements, provide additional guidance, and review products. Use of the COBP should be regarded as a community standard for all C2 assessments.

This decisionmaker's guide aims to help decisionmakers who commission, fund, oversee, and employ C2 assessments. It provides 1) an executive summary of the NATO Code of Best Practice (COBP) for C2 Assessment, 2) information on how decisionmakers can best ensure that the COBP is adhered to by those carrying out C2 assessments, and 3) guidance on the limits of assessment and the use of C2 assessment results.

Background

The initial version of the NATO COBP for C2 Assessment was published in 1998, as the culmination of several efforts by various NATO study groups to address C2 assessment challenges and practices.

While this initial version focused on Article V related operations, this version of the COBP addresses all issues of C2 assessment across the full spectrum of operations, to include Operations Other Than War (OOTW). Experience with the initial version of the COBP highlighted the need to produce a short, executive-level version of the COBP aimed specifically at decisionmakers.

Command and Control Assessment

$C2^2$ is recognized as a critical element of successful military operations and a key aspect of Information Age transformation. Until recently, however, physics-dominated issues of military operations, rather than C2 ones, have been the primary, almost exclusive, focus of military analysis and assessments. This, coupled with the inherent complexity of C2 (which involves both the information and cognitive domains), has presented the assessment community with challenges that are less well researched and understood and with a tool kit that is clearly lacking. The NATO COBP for C2 Assessment, therefore, has been developed to help C2 analysts deal with these new Information Age assessment challenges so that they can improve their ability to take on analyses of requirements, analyses of alternatives, research on new C2 concepts and capabilities, and support real world operations. This guide addresses how the decisionmaker, as a customer of C2 assessments, plays a key role in such assessments.

Role of the Decisionmaker

The decisionmaker has a critical role in any assessment. The decisionmaker provides the initial articulation of the problem or issue at hand and establishes the conditions under which the effort takes place. In addition, it is the decisionmaker who determines how the assessment results are interpreted and whether they influence decisions. When the decisionmaker interposes subordinates between him and the assessment team he must understand the resulting risks and take action to mitigate them where possible.

The decisionmaker's role in a C2 assessment is most definitely a hands-on one. Experience shows that C2 assessments that have had active decisionmaker participation are more likely to result in products that satisfy both decisionmakers and the members of the assessment team. Annex A provides some key questions to encourage the necessary discussions between the decisionmaker and the assessment team at various points in the study effort. This guide will provide, at a high level, information that will assist the decisionmaker in assessing the answers. The full COBP provides a more detailed treatment of these items and the decisionmaker may want to consult the full COBP as appropriate.

The interaction between the decisionmaker and the assessment team is not only critical to getting the effort off on the right foot but is essential if the decisionmaker is to fully understand the results of the assessment and the assumptions that underlie these results. Furthermore the assessment team will, at various times during the study, have important choices to make.

Decisionmaker involvement in these choices can make the difference in a study's success or failure

> **Establish a reasonable set of initial conditions**
> **Stay involved throughout the study**
> **Maintain consistent focus on the real problem**

Organization of the Guide

The remainder of this guide is organized into the following four sections:

- Preparing for Success

- Overview of the Assessment Process

- Monitoring the Assessment

- Reviewing the Products

In *Preparing for Success*, the things that the decisionmaker can do to enhance the likelihood that the effort is successful are discussed. In the *Overview of the Assessment Process*, each of the component steps in the assessment and their relationships one to another are discussed. In *Monitoring the Assessment*, key considerations are identified, any one of which could be a determining factor in the success or failure of the effort. *Reviewing the Products* addresses the nature of the products a C2 assessment should be expected to produce.

Preparing for Success

The are two major prerequisites for successful C2 assessments. First, a clear and unambiguous statement of the decision or issue to be addressed. Second, a well qualified assessment team with adequate time and resources. While this may seem obvious, all too often either one or both of these two conditions are not met. In these cases, it may be best not to undertake an effort that will be doomed to failure from the start. This extreme option can be avoided by properly scoping a study to make the effort feasible.

To begin with, every effort needs to be made to ensure that the assessment team understands the problem or issue they are to address. Any statement of the problem will contain a set of implicit assumptions and constraints that may be known and understood by the decisionmaker but not by members of the assessment team. An effort should be made to make these explicit.

C2 assessments are often undertaken on very "ambitious" schedules with inadequate resources. Experience has shown that C2 assessments involve great complexity, difficulty in getting appropriate data, and the need for significant sensitivity analysis to deal with uncertainty and risk. Therefore, plan conservatively. This will avoid the situation where the effort runs out of time and resources before significant parts of the assessment can be completed or the assessment team is forced to not consider or measure or analyze key, often driving aspects of the problem.

An assessment team will rarely have all of the expertise or experience needed to do the job right. The same is true for empirical data and the results of other efforts.

Access to the right people and information is every bit as important as having a well articulated problem and adequate time and resources. It is essential that these needs are anticipated before the study begins so that appropriate arrangements for access are arranged. Failure to accomplish this at the start often results in delays, cost overruns, and compromises the quality of the products. Additionally, the routine collection of data during exercises and military operations will facilitate a standing collection of data available for future C2 assessments.

The NATO Code of Best Practice for C2 Assessment has proven itself to be useful to both highly experienced analysts and those without much experience. It is recommended that decisionmakers insist that the assessment team review the COBP before they develop their study plans and inform the decisionmaker if, when, and why the advice and or processes contained in the COBP will not be followed. Any deviation from the best practices described in the COBP carry risks and these risks need to be understood by decisionmakers before they agree to waive portions of the COBP for a particular effort.

Ensure that the problem is understood

Allocate adequate time and resources to the effort

Plan conservatively

Ensure study leadership has appropriate breadth and experience

Ensure access to needed expertise and data

Mandate the use of the COBP

Overview of the Assessment Process

Figure 1 depicts the C2 Assessment Process. This process is iterative. It is applicable to any type of C2 assessment, regardless of the scope or focus of the assessment. In fact, each of the steps in the assessment process will be revisited several times during the course of the effort.
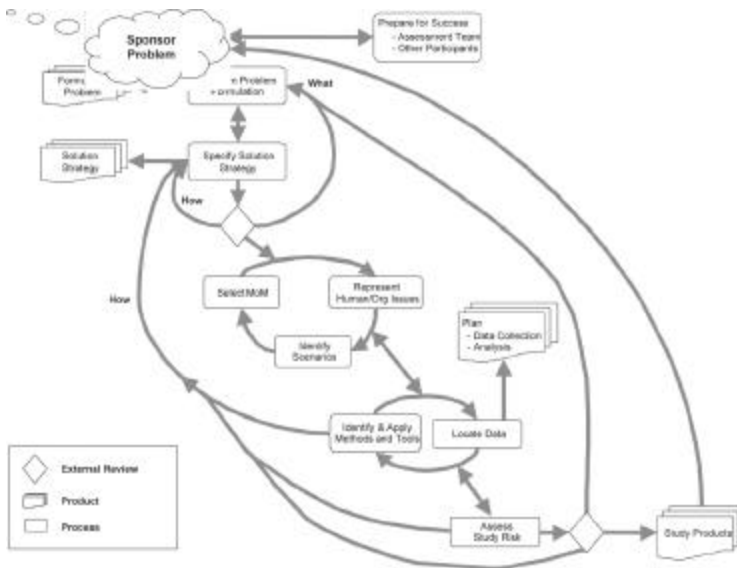

Figure 1. C2 Assessment Process

In *Problem Formulation*, the Assessment Team answers the question of **what** is to be addressed by the effort. The *Solution Strategy* addresses **how** this will be accomplished. The remainder of the process carries out the solution strategy and produces the assessment products. Problem Formulation and development of the Solution Strategy for C2 assessments should be an iterative process.

The decisionmaker should schedule an initial review with the assessment team to ensure that they are on the right track after the assessment team has gone through *at least* one full iteration, specifying not only what they will do but also thinking about each of the remaining steps in the process in some detail. Prior to this review, the assessment team should have their study plan (this consists of both a statement of the formulated problem and their solution approach) peer reviewed.

It should be expected that modifications will need to be made in either the solution approach or in the formulated problem as greater understanding is gained. The decisionmaker must be informed when significant changes are made. Such changes may for example be the result of discovering that some data needed to support a particular measure of merit (MoM) is not available. In such cases the study plan needs to be revised to develop a surrogate MoM, collect the appropriate data, or conduct a sensitivity analysis.

Risks and uncertainties are an inherent part of C2 assessments. These risks and uncertainties can not be completely eliminated, therefore they must be managed. It should be noted that each iteration ends with a consideration of residual study risk. Decisionmakers should expect that any recommendations to significantly change the study plan should be accompanied by an explanation of the risks to study objectives, schedule, and costs. Hence, the continuous involvement of the decisionmaker ensures that the study effort remains appropriately focused and that the study team is kept aware of decisions and developments that influence the study.

> **Involvement of decisionmaker is key**
> **Process must be iterative**
> **Initial review needed to ensure proper start**
> **Look for explicit treatment of risk and uncertainty**
> **Expect adoption of study plan as insight is gained**

Monitoring the Assessment

The first two steps in the assessment process are Problem Formulation and Solution Strategy. The product of these two steps is the study plan which describes the **what** and **how** of the assessment effort.

Participating in Problem Formulation

Effective problem formulation is fundamental to the success of any assessment, but particularly C2 assessment because C2 issues are often ill-defined and complex. The problem formulation process identifies the context of the study and aspects of the problem-related issues for assessment. The context of the study includes the geopolitical environment, aims and objectives of the study, and the decisions to be supported by the assessment. Problem-related aspects include the issues to be addressed, assumptions, high-level MoMs, independent variables (both controlled and uncontrolled), and constraints on variables. It must be recognized that problem formulation takes time and must precede development of the assessment concept or selection of the solution approach (including methods and tools). The

decisionmaker plays a critical role in problem formulation by providing an understanding of the real problem to be addressed and how study results will support pending decisions.

The team should be expected to quickly cover the whole problem and produce an initial problem formulation to prevent premature narrowing of the assessment and to allow a common understanding among all team members. This will identify the key issues to be addressed and define the context of the study.

As a result of this process, the assessment team may discover important issues related to the problem that need to be discussed with the decisionmaker.

> **All key variables should be included in the assessment**
> **Relationships should be known or hypothesized**
> **All controllable variables should be identified**
> **Key assumptions should be made explicit**

Monitoring Solution Strategy

A solution strategy consists of the specification of a set of sequential and parallel analytical steps, often involving several methodologies and tools. The solution strategy should begin with what is known, and by its execution, lead to what the decisionmaker desires to know—insight into the issue(s). The solution strategy can be simple, moderately complicated, or extremely complex.

The development of a solution strategy is an iterative process that should strike an artful balance between what the team would like to do and what is possible to do, given the state of the art, available data, tools, schedule, and resources available. The team first elaborates on the measures that are to be evaluated in the study. Using these measures and consideration of human and organizational factors, a conceptual model of the assessment is developed. The conceptual model is based on the issues formulated in the problem formulation and is not driven by the availability of tools and data. The conceptual model is the embodiment of our current understandings and may be changed by the study findings.

Frequently a solution strategy becomes complex, requiring the team to decompose the problem into parts, each of which requires assessment with its own set of tools. Taken together, the solution strategy consists of the MoMs, relevant human and organizational factors, specification of scenarios, data collection requirements, and methods and tools to be used in the assessment.

> **Solution strategy should be clearly articulated**
>
> **Potential problems should be identified with contingency plans**
>
> **Conceptual model should not be constrained by available data or tools**
>
> **Conceptual model initially represents current understandings and may evolve**

Approving the Study Plan

The solution strategy is documented in a study plan that links the problem formulation and solution strategy together in one plan. The study plan shoud be complete and include: MoMs, Human Organizational Factors, Scenarios, Methods and Tools, Data consideration, Peer reviews, in-process reviews, risk and uncertainty, and products. The Study Plan should be developed in an iterative fashion, applying guidance and feedback received from the decisionmaker and other stakeholders. It is important that the Study Plan is peer reviewed.

The study plan, presented by the assessment team to the decisionmaker, should be approved before significant resources are expended. Often the study plan is supported by a study management plan to guide, manage, and coordinate the effort. The study management plan may have subordinate plans, to include an analysis plan, modeling and simulation plan, data collection plan, configuration management plan, quality assurance plan, review plan, deliverable plan, security plan, as well as a study risk register, and glossary.

> **Study plan should be complete**
> **Study plan should be realistic in terms of schedule and resources and allow for multiple iterations**

Conducting In-Process Reviews

The in-process reviews are critical to the success of the effort. They should be at key junctures including: After initial problem formulation, After initial version of study plan, Prior to data collection, Between collection

and assessment, Prior to draft products. These are an opportunity for the decisionmaker to make sure that the study, if completed as planned, will answer the question of interest and also to make appropriate changes in the study plan to correct its deficiencies. Furthermore, reviews help the decisionmaker to harmonize studies conducted in parallel under their aegis dealing with interrelated issues.

During the initial review the decisionmaker needs to make sure that all of the key assumptions related to the assessment are fully discussed and are appropriate. In addition, these reviews should include a full discussion of study and decision risks.

A discussion of the results of the peer review and a review of the products that the study will produce should also be done at this time.

> **Conduct reviews at key junctures:**
> **After initial problem formulation**
> **After initial version of study plan**
> **Prior to data collection**
> **Between collection and assessment**
> **Prior to draft products**

Accepting Measures of Merit (MoMs)

MoMs are central to meeting the objectives of all assessments. Their development is particularly challenging for C2 assessments, given the nature of the problems addressed. It is recognized that no single measure, or class of measures, is sufficient. An orchestrated set of MoMs is typically required for C2

assessments. The COBP has adopted the following hierarchical set of MoMs:

- Measures of Policy Effectiveness (MoPE) that focus on policy or societal outcomes

- Measures of Force Effectiveness (MoFE) that focus on how a force performs its mission or the degree to which it meets its objectives

- Measures of C2 Effectiveness (MoCE) that focus on the impact of C2 systems within the operational context

- Measures of Performance (MoP) that focus on internal system structure, characteristics and behaviour

- Dimensional Parameters (DP) that focus on the properties or characteristics inherent in the C2 system

A good C2 assessment will establish relationships among the measures used in the assessment. Establishing these relationships between types of measures, however, is among the most challenging parts of any assessment. It is important to recognize that even approximate relationships among the right MoMs are far preferable to "precise" relationships between MoMs that do not adequately reflect the key issues at hand. Criteria have been developed that help to ensure that the measures that are selected are both valid and reliable. For a measure to be considered valid, it must be mission oriented, realistic, appropriate, inclusive, discriminatory, meaningful, simple, relevant, and generalisable. For a measure to be considered reliable, it must be discriminatory, measurable/observable, quantitative, objective, sensitive, and consistent. A proposed measure may be reliable but

not valid, or it may be valid but not reliable. The decisionmaker should insist that, to the extent possible, the measures to be used are valid, reliable, and, if calculated, will provide desired information. The risk assessment should characterize the degree to which the MoMs may not be valid and reliable and describe the mitigating actions taken.

Ensure MoMs are valid, measured reliably, credible, and complete

Considering Human and Organizational Factors

The human dimension largely distinguishes C2 assessment from other military operations assessment. C2 assessment must deal with distributed teams including military, interagency, coalition and other non-state actors operating under stress and their varying decisionmaking behaviours. In operations other than war, particular attention must be paid to behaviour of and interaction with non-military organizations, political groups, and amorphous groups such as crowds and refugees. Thus, the formulation of the problem and the development of solution strategies cannot be completed without explicit consideration of both human and organizational issues.

Human performance affects behaviour and vice versa. Human performance depends on psycho-physiological, and cognitive variables such as stress, fatigue, sleep deprivation, hunger, alertness, personality, and predisposition, as well as on ergonomic and external factors. Individual and group behaviors are also the result of social interaction impacted by fear, morale,

value systems, culture, education, and religious backgrounds of individuals. When human performance and/or behavior is at issue, parameters and/or models will need to reflect those issues. Particularly critical is how human decisionmaking is addressed in the assessment, and/or in models used in the assessment. The human factors mentioned above, as well as the command style, risk style, and other command attributes that impact human decisionmaking, must be accounted for in the modeling and assessment. The decisionmaker can be invaluable in this regard if he/she is also the subject of assessment by making sure the assessment team understands their approach to decisionmaking.

There is a strong direct link between human and organizational issues. Properly done, organizational design reflects the interaction of tasks to be done, the people available to perform them, and the systems or tools that support them. Because of the need for co-evolution organizational design is often a key independent variable. Organizations, then, depend on the capabilities, training, and experience of the people in the C2 system. Organizational factors must be addressed as part of most C2 analyses. Organizational factors include structural (e.g. number of echelons, span of control), functional (e.g. distribution of functions, information, and authority), and capacity (e.g. personnel, communications) factors. The large number of organizational variables that may be relevant to C2 assessment must be approached carefully and systematically. When possible, organization theory expertise should be brought into the team. The assessment team will be challenged to identify factors that are particularly relevant to their C2 assessment, and to identify and employ appropriate tools.

Explicit consideration of human/ organization performance
Inclusion of appropriate expertise on the team

Approving Scenarios

The selection of a proper set of scenarios is critical to the assessment. Scenarios consist of four elements— a context (e.g., a characterization of a geopolitical situation), the participants (e.g., intentions, capabilities of friendly, hostile, neutral), the environment (e.g., natural—weather and man made—mines), and the evolution of events in time. Scenarios can be approved or unapproved. Some are operational scenarios, meaning they contain additional details and may exist in a model. Sometimes smaller scenarios, called vignettes are developed for analytic use.

In C2 assessments, the purpose of scenarios is to ensure that the assessment is informed by decisionmaker planning assumptions and the appropriate range of opportunities to observe the relevant variables and their interrelationships. Although the ideal would be for the assessment to be scenario independent, rarely does this happen due to the breadth and complexity of C2. Therefore, scenarios must be considered throughout the assessment process, especially during problem formulation. In essence, the role of scenarios is to define a set of conditions and restrictions to enable credible assessment as well as to create a structure within which the results of the assessment can be understood and interpreted.

Scenarios must be designed or selected to address C2 under a broad range of circumstances. C2 assessments need to use multiple scenarios, no single scenario is sufficient. For C2 assessment, scenarios should reflect the C2 organization, processes, and systems relevant to the assessment. In selecting scenarios for C2 assessment, the analyst should ensure that the scenarios reflect the factors that have significant impact on C2, stress C2 issues, are credible to the military, are credible in terms of civil-military objectives, and will facilitate the study design process. Note that this implies a broader selection of scenarios than is normally contained within current sets of "approved" scenarios. Due to their critical importance to the study, the decisionmaker must pay particular attention to the design and selection of scenarios.

> **Ensure:**
>   **Multiple scenarios**
>   **The set of scenarios cover the range of relevant situations**

Understanding the Methods and Tools

There is a broad range of methods and tools available to be applied to C2 assessment. The methods and tools fall into one or more of four categories—data collection/generation tools (e.g., simulations, exercises, experiments, expert elicitation, real world operations), data organization tools (e.g., causal mapping, multi-criteria decision analysis, neural nets), "solving" tools (e.g., mathematical analysis, linear programming, goal programming), and support tools (e.g., data analysis, databases, checklists, spreadsheets). Although the

focus of recent past research has been on the development of computer simulations, virtually any of the analytic tools in the analyst's inventory could potentially be applied to C2 assessment.

The development or selection of tools for C2 assessment should be based on evaluation of candidates against functionality-based and performance-based selection criteria. Functionality-based selection include resolution/detail, completeness/scope, the functionality coverage provided, the explicitness of entity representation, the ability to generate appropriate MoMs, and whether the tool has been verified, validated, and accredited (VV&A) for the intended use. Performance-based selection criteria include responsiveness, simplicity, time to prepare/use, data availability, interoperability with other tools, resources required, and credibility with customers and users. Decisionmakers should refer issues regarding the selection of methods and tools to peer review.

Although the assessment team will employ any tool that assists in addressing study issues, credible computer simulations are what most analysts seek. The development of C2 simulations, especially those that link C2 to force effectiveness, has been the subject of much research recently. Decisionmakers should be aware that, although significant progress has been made, many challenges still exist in the modeling of C2. Among these challenges are representation of human behaviour, linking/federating models, representing adversarial entities, dealing with uncertainty in model representations, conduct of sensitivity analysis with models, and the VV&A process.

The assessment team should seek approval from the decisionmaker for the models that will be employed as part of the assessment. Decisionmakers should ask how C2 is represented in proposed models and how model outputs will provide the data necessary to address the C2 issues under study.

> **Study needs should drive tool selection, not vice versa**
> **Seek clear rationale for tool selection**
> **Multiple tools are normally needed**
> **Demand explicit linkage from methods and tools to study issues**

Comprehending the Data

The role and importance of data in C2 assessments is underestimated by many. The ability to determine what data are needed and the ability to collect these data in fact determine in large part the solution strategy (an example of the importance of thinking of the assessment process as iterative in nature). There may be many types of data required, to include scenario data, human performance data, and systems performance data. Decisionmakers and analysts prefer data to be sharp, certain, complete, and consistent, but recognize this will not always be the case. For C2 assessment, it is particularly difficult to meet these criteria.

Hence, not all C2 related data required/desired by the analysts will be readily available. Some of it will have to be aggregated or derived from other sources, or perhaps generated from original sources. C2 related data can be obtained from a variety of sources to include official sources (e.g., military databases), open

sources (e.g., Internet), legacy studies, and subject matter experts. The assessment team must understand what data are needed and in what form, who owns the data if it already exists, and the costs involved in buying, collecting, or generating required data. These costs can be significant. The decisionmaker can help the assessment team by assisting in identifying available or potential data sources. Furthermore, the quality of the study results is influenced by the quality of data used as much as by the selection of respective methods and tools.

> **Articulate the assumptions related to collection**
> **Understand data anomalies and adjustments made to data**
> **Understand data sources**
> **Look for data distributions, not just averages**
> **Help the assessment team get the data they need**

Understanding Risks and Uncertainties

There are risks associated with the decision at hand and there are risks related to the assessment process. Failure to deal effectively with both of these types of risk will jeopardize study goals.

Risk is commonly defined as the possibility of suffering harm or loss, to include opportunity loss. Risk often has a negative connotation, yet "taking risks" can also be positive. Uncertainty can be defined as an inability to determine a variable value or system state or predict its future evolution. Uncertainty is inherent in risk. Risk

and uncertainty are especially prevalent in C2 and in C2 assessment. C2 issues are inherently complex and have many interacting factors. Additionally, C2 assessment is effected by uncertainties in scenarios, data, and models.

Risk can be dealt with in C2 assessments by either reducing the uncertainty that underlies the risk, by embracing and accounting for residual uncertainties, or by communicating the risk involved and adopting a decision strategy that mitigates the risks. Uncertainty can be reduced in C2 assessment in a number of ways, to include conducting certification of data, conducting proper VV&A of models, and in conducting sensitivity analysis. The assessment team should make a serious effort to illuminate the risks and to conduct an explicit risk-based assessment (consideration of multiple potential solutions). With problems involving human decisionmaking the analyst must be aware of the diversity of courses of action that are possible as a scenario evolves. The analyst should also attempt not to unduly bound the problem during problem formulation to reduce risk. The decisionmaker can help the analyst with these efforts by helping to identify risks and uncertainties and by discussing his or her own approach to risk and uncertainty regarding the study issues and the decisions to be made based on the assessment.

Failure to adequately deal with risk jeopardizes study goals
Sensitivity analyses should be provided and explained

Reviewing the Products

Assessment products include the study plan, periodic status/progress reviews, and the final report. The decisionmaker has an important role in each. The study plan should be presented at the initial review and the decisionmaker should approve it. The study plan should serve as a shared understanding between the decisionmaker and among the study participants. However the iterative nature of good C2 assessments means the study plan should be flexible.

Periodic reviews should be chaired by the decisionmaker. The study plan should go through a peer review process prior to finalization. In addition to these products, there are a number of other products that best practice demands be produced and maintained during the course of the study. These include a project journal, a study design and implementation plan, a data collection plan, a data analysis plan, and a risk register. All products should be archiveable and readily accessible by the community, within the constraints of security. It is recommended practice that a version be prepared at the lowest classification possible to allow for the widest distribution possible and reuse in the assessment community.

The decisionmaker should be able to brief the study and explain its results

Data should be saved in a form amenable to re-use

Study products should be peer reviewed

A plan should be developed for archiving and dissemination

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[1]North Atlantic Treaty Organisation (NATO) *NATO Code of Best Practice for C2 Assessment*, 2002.

[2]NATO defines C2 as "The Organization, Process, Procedures, and Systems necessary to allow timely political and military decisionmaking and to enable military commanders to direct and control military forces."

Decisionmaker's Temporal Question List

T his annex contains key questions that a decisionmaker should ask the C2 assessment team. These questions are organized temporally according to the following phases of a study (prior to the study, at initial review, after first iteration, and at final report).

Prior to the Study:

- Do you understand what decisions(s) I have to make, when I have to make them, and the context within which the decision(s) will be made?

- Do you need any information or authorization from me?

- Who will be on the study team?

  · Are there adequate skills, experience present in the team?

- For OOTW studies, in particular, are there adequate social scientific skills in the team?

- Who are the key organizations/individuals with whom you plan to interact (e.g., stakeholders, data providers, review team)?

  - Have you coordinated the Terms of Reference with them?

  - How do you plan to interact with them?

- Particularly for OOTW studies, how will you acquire the requisite knowledge of the culture/ historical context?

- How will you undertake problem formulation? e.g.,

  - What products will you review/mine?

  - What methods and tools are applicable?

- When will key events occur? (e.g., reviews, production of interim products)

At the Initial Review:

- What do you perceive the "real" issues to be?

- What assumptions do you plan to make to scope the effort?

- What do you plan to use for:

  - High level MoMs?

  - Scenarios of interest?

- Have you identified any additional organizations/ individuals with whom you plan to coordinate?

- How do you plan to attack the problem?

  · What methodology will you employ?

  · How will you treat the diverse aspects of a mission capability package (including concept of operations, organization, doctrine, C2 approach, systems, personnel, facilities, in other words everything needed to field a real capability.)

  · How do you plan to address organization/ human issues?

  · What specific methods and tools will you employ? Why do you think they are appropriate?

  · What data will you employ? Where will you get them? Why do you think they are appropriate? How do you plan to make the data accessible to others? How do you plan to depict the results of the study?

At First Iteration:

- What specific MoMs were selected? What relationships were established among the MoMs?

- What range of scenarios were selected? Why?

- What plans do you have to illuminate uncertainty/ sensitivity?

- What feedback did you receive from the independent review team? What steps did you take to respond to it?

- What do you plan to do on subsequent iterations?

  - Use additional tools?

  - Consider additional scenarios, assumptions?

  - Modify assessment boundaries?

At Final Report:

- What are the major findings, recommendations?

- What are the key points of uncertainty/sensitivity?

- What issues were not addressed that should be treated in subsequent assessments?

- What key lessons did you learn with respect to methods, tools, and data?

- What steps are you going to take to disseminate key insights, products to the broader community?

- Are there any voids/issues that warrant further research?